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Population Dynamics and Diversity of Cladocera in Relation to Some Physicochemical Status of Freshwater Lake Ramala, Chandrapur.

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A B S T R A C T

Zooplankton, the group of micro animalcules found in the aquatic ecosystems, which is assemblage of taxonomically unrelated microscopic organisms with common ecological habitat. These are drifting in the epilimnion layer and occupy an intermediate position in the aquatic food web. The zooplanktons constitute a specific group of organisms providing a link between producers and successive consumers in aquatic ecosystem. They also indicate trophic status of a water body and some of them are also bioindicators of pollution. They are highly sensitive to environmental variation, as a result, change in their abundance, species diversity or community composition. Zooplankton population is composed of four groups, Ostracodes, Rotifers, Copepodes and Cladocera. Present paper deals with the population density and diversity of Cladoceran species in relation to physicochemical fluctuations in water body. Samples were collected from three different sites of Ramala lake during June 2018 and May 2019, following to which further analysis was carried out according to APHA (1992) and Trivedi and Goyal (1986). Total eight different species of Cladocera were found during the study period.

1. Introduction:

Zooplanktons are important for their role in trophic dynamics and in energy transfer in the aquatic ecosystem. They provide food for fishes in freshwater lakes, ponds and river and play a major role in fish production. A notable contribution of planktonic forms of freshwater ecosystem is available due to Sharma 1996, Kodarkar 1999. Zooplankton occupy a central position between the autotrophs and heterotrophs. In general, they belong to five main taxonomic groups. Protozoa, Rotifera, Cladocera, Ostracoda and Copepoda. The Copepoda and Cladocera are dominant groups of crustaceans found in freshwater habitat.

Zooplanktons include a variety of assemblage of taxonomically unrelated microscopic organism having common habitat and thus common ecological characteristics. Many species of Zooplankton are primary consumers and feed on phytoplankton. They themselves are used as a food by fishes. Among the different zooplankton the Cladoceran population constitute a group of microscopic organisms, occurring in a variety of aquatic habitats. Cladocerans constitute the dominant groups of freshwater habitats. Sharma and Michael (1987) explained that the limnetic zooplankton community invariably dominated by the species of Cladocera. Cladocerans popularly called as water flea prefer to live in deep water. Generally, they inhabit the ponds, lakes, rivers and reservoirs and reported to occur dominantly in lentic waters (Raghunathan, 1989 and Sharma, 1991).

Ramala lake is a historical impoundment built up by Gond King around Chandrapur city for drinking and irrigation purpose. It is situated about 232 meters above sea level and is at 79°18'15" E longitude and 19°18'15" N latitude. It harbours variety of aquatic plants and animal species. It is the only remnant of greenery in this polluted and

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overcrowded city like Chandrapur. Present paper deals with study of Zooplankton species present in Ramala lake, which is perineal water body. Freshwater zooplankton is an important component of aquatic ecosystem, whose main function is to act as a primary and secondary link in the food chain. (Hutchinson, 1967).

Adequate knowledge of the zooplankton communities and their population dynamics is a major requirement for better understanding of life processes in a freshwater body since eutrophication influences both the composition and productivity of zooplankton. (Bhora and Kumar, 2004) Since they are longer and easier to identify than phytoplankton, sample can be processed more rapidly, and biologists can be trained in a relatively short time. Zooplankton communities are very sensitive to environmental changes and thus are of considerable potential value as water quality indicators.

1.1 Objectives:

- To analyse the physicochemical characteristics of Ramala lake during study period.
- To identify and study different cladoceran species.
- To find out correlation between physicochemical status of water body and species composition as well as abundance of Cladoceran.
- To propose conservation methods.

2. Material and method:

2.1 Study area:

Ramala lake is perennial rainfed water body centrally located in Chandrapur city (Maharashtra). The lake water is used for various domestic purposes, washing, bathing, swimming, religious activities, etc. On the basis of topography, three sampling sites were selected for collection of samples. Samples were collected on monthly basis during June 2018 and May 2019. Monthly samples were collected for the study of zooplankton using plankton net made of botting nylon cloth (mesh 25 cm) by filtering water samples from three different sites of Ramala lake. For identification of Zooplankton species water samples were examined under the microscope with high magnification. For such work the preserved material should be as fresh as possible because long term preservation often distorts the specimens. Standard literature was used for identification of zooplankton species such as Tonapi (1980), Battish (1992) and Murigan et al (1998). Zooplankton samples were collected monthly from June 2018 to May 2019. Physico-chemical analysis of samples was carried out according to APHA (1992) and Trivedi and Goyal (1986). For numerical estimation of zooplankton, the organisms were observed under light microscope using Sedgwick Ratter Cell as per the procedure given in standard methods (ADHA 1992).

3. Result and Discussion:

During the present study, it was observed that zooplankton found in Ramala lake water mainly compromised of five groups. Protozoa, Rotifera, Cladocera, Copepoda and Ostracoda along with nauplii Larvae and eggs. Cladocerans are filter feeders and feed on algae and phytoplankton. At the same time, they themselves are favourable prey of aquatic animals including fishes. Thus, cladocerans represent a key group in energy transfer along food chain. The group Cladocera of Ramala lake is represented by eight species. The group was flourished as a second dominant group at all stations contributing 25% of the total zooplankton, with maximum density in summer and minimum in winter. Representative members of this group were *Cereodaphnia cornuta*, *Moina mirura*, *Alona pulchella*, *Chydorus sp.*, *Pleuroxus similis*, *Macrothrix laticornis*, *Senocephalus sp.*, *Leydigia sp.* etc. *Cereodaphnia corruta* was found continuously throughout the study period. *Alona sp.* was found only in winter months. Out of 11 families of Cladocera, eight families have been reported from Indian water, which represent about one fourth of world cladoceran fauna (Rao and Chaubey, 1993)

A relative abundance of Cladocerans especially the members of family Chyrodidae indicate eutrophic conditions (Khan and Seshagirao, 1981). According to Mahajan (1981) Diaphanosoma, Simocephalus and Ceraodaphnia are indicators of Eutrophication. The factors like water temperature, dissolved oxygen, turbidity and transparency plays an important role in controlling the diversity and density of Cladocerans. Presence of more nutrients leads to eutrophic condition of water body, which is favourable condition for growth of cladocerans. Higher nutrient content is the indicator of rich zooplankton. Maximum population density was observed in winter during present study which may be due to favourable temperature and availability of abundant food. Most of the Cladoceran species feed on microscopic algae and detritus matter. Similar observations were recorded by Pulle and Khan (2003) and Thirumathal (2006).

Table 1 : Cladoceran diversity (No/L) during June 2018- May 2019

Months	S1	S2	S3	Total
June	03	01	02	06
July	09	10	06	25
Aug	09	08	11	28
Sept	12	11	08	31
Oct	14	10	12	36

Nov	13	09	11	33
Dec	11	08	09	28
Jan	12	08	08	28
Feb	08	07	09	24
March	07	08	05	20
April	05	06	04	15
May	04	02	03	09

Table 2: Monthly variations in Physicochemical parameters values in Ramala lake from June 2018 to May 2019.

Month	pH	Temp (°C)	Sulphate(mg/L)	Phosphate (mg/L)	Nitrate (mg/L)	Turbidity (NTU)
June	7.8	27.5	8.4	3.24	1.62	27.8
July	7.6	26.8	7.3	3.22	1.22	32.20
August	7.5	24.3	7.8	4.32	1.14	30.71
September	7.6	27.2	8.6	3.28	0.96	28.96
October	7.8	27.8	7.8	2.12	0.82	22.44
November	7.9	7.5	7.5	1.54	0.68	21.00
December	7.4	7.2	7.2	1.04	0.56	15.08
January	7.6	6.8	6.8	1.38	0.88	14.08
February	7.9	8.2	8.2	1.48	1.40	15.22
March	7.8	7.4	7.4	2.28	1.26	18.98
April	7.2	8.6	8.6	3.14	1.74	21.62
May	7.5	8.2	8.2	3.56	2.16	23.16

4. Conclusion

The zooplankton population density is generally affected by water quality, availability of food, carnivorous zooplankton and other animals in the water body. The present study revealed that different physicochemical parameters like pH, temperature, turbidity, sulphate, phosphate, nitrate, etc. are acting as limiting factors and are influencing the diversity as well as population of Cladocera. As the Cladocerans are connecting link in the food web, it is necessary to conserve the diversity of this group along with other biotic components.

5. References

- Apha, (1992), Standard methods for examination of water and wastewater, 18th edition, Washington.
- Battish, S.K. (1992) Freshwater Zooplankton of India, Oxford IBH Publishing Co.Pvt.ltd. New Delhi.
- Khan, M.A. and I. Seshagiri rao (1981) : Zooplankton in evaluation of pollution, Cent. Bd. Prev. Cont. Poll. Osmania University, Hyderabad 121-133
- Kodarkar M.S. (1999) Conservation of lakes in and around Hyderabad, I.A.A. 13. Pub: Hyderabad
- Mahajan, C.L. (1981) Zooplankton indicators for the assessment of water pollution. Cent. Bd. Prev. Cont. Poll. Osmania University, Hyderabad 135-148
- Murugan, N.P. Murugavel and M.S. Kodarkar, (1998), Cladocera, Indian Association of Aquatic Biologist, 55 pp.
- Pulle, J.S. and A.M.Khan (2003) studies on zooplanktonic community of Isapur dam water, India. Poll. Res, 22(3): 451-455
- Raghunathan, M.B. (1989) Indian Cladocera (Crustacea) Indian review in life science, 9:137-152
- Rao, K.S. and Usha Choubey (1993) Systematic and ecological studies on central Indian lentic Cladocera, In. Prof, K.S. Rao, Recent Advances in freshwater Biology, I:264 – 276
- Sharma, B.K. (1991) Cladocera, Animal Resources of India pp 205-223
- Sharma, B.K. and R.G. Michael (1987) Review of taxonomic studies of fresh water Cladocera from India with remarks on biogeography.
- Sharma. B.K. (1996) Biodiversity of fresh water rotifera in India, a static report proc.zool, soc. Calcutta. 49: 73-85
- Thrimathal. K. (2006) Cladocerans of Amaravathy Reservoir, Udumalpet, Coimbatore District, Tamil Nadu, India.
- Tonapi, G.T. (1980) Freshwater animals of India, Oxford Publishing Co.Pvt.Ltd, New Delhi.
- Trivedi, R.K. and P.K. Goel, (1986) Chemical and biological studies for water pollution studies. Environ. Pub. Karad, India.